source is a Helium-Neon light source" (page 2 of the action), but claims to find this element in Zhang - "Zhang shows a Helium-Neon laser light source for producing two harmonically related, single frequency output beams" (page 2 of the action). We disagree.

We submit that Zhang does not show "a Helium-Neon laser light source that generates two harmonically related, single frequency output beams," as required by the rejected independent claims (emphasis added). To the contrary, Zhang describes generating a beam with two orthogonally polarized frequencies, where the frequency splitting is only very small (e.g., from about 10 to a 1000 MHz) relative to the central optical frequency of the beam (e.g., 4.74×10^8 MHz for the 633-nm wavelength of a Helium Neon laser). See, e.g., col. 3, lines 30-38 and the Abstract of Zhang. Where the two frequencies are so close to one another, they cannot be said to be "harmonically related." More generally, it appears that the action is confusing the frequency splitting used in heterodyne detection (which commonly involves the frequency differences described in Zhang) with the harmonically related frequencies used in a dispersion interferometer, as described in Hill, who also uses heterodyne frequency splittings in each of the harmonically related frequencies (see, e.g., col. 49, lines 44-47).

For example, Zhang states: "[i]n laser interferometers, a large frequency difference is used to enhance measurement speeds. For example, the Optodyn Co. (USA) has been using tens MHz in its interferometers" (col. 1, lines 20-23), whereas "[t]his laser can obtain various frequency difference, form [sic] a few MHz to more than one thousand [MHz], to match different applications" (col. 1, lines 50-52).

Even such large frequency splittings are incredibly small, however, when compared to the optical frequency of the Helium Neon beams, which corresponds to about 633 nm. As is well known, the conversion from wavelength λ to optical frequency ν, is given by $\nu = c/\lambda$, where c is the speed of light and equals 3×10^8 m/s. Thus, 633 nm corresponds to $(3 \times 10^8)/(633 \times 10^{-9})$, which equals 4.74×10^{14} s^{-1}, or equivalently, 4.74×10^8 MHz. In other words, the largest frequency splitting disclosed in Zhang is still more than five orders of magnitude smaller than the optical frequency of the Helium Neon beams.

Dispersion interferometry, on the other hand, involves two beams with "harmonically related" frequencies. The simplest example is where one beam has a frequency twice that of the

other beam, which is equivalent to saying that the wavelength of the second beam is twice that of the first beam. Hill defines the harmonically related frequencies for dispersion interferometry as follows: "The ratio of the wavelengths (λ_1/λ_2) has a known approximate ratio value (l_1/l_2), i.e., (λ_1/λ_2)≈(l_1/l_2), where l_1 and l_2 comprise low order nonzero integer values" (col.. 49, lines 38-43 of Hill, emphasis added). Thus, for the simple example above, l_1 and l_2 are 1 and 2, respectively.

In contrast, for the two frequencies produced by Zhang's source to meet the equality in Hill requires the integers l_1 and l_2 to be on the order of the ratio of the Helium Neon optical frequency (about $4\text{x}10^8$ MHz) to the frequency difference (about 1000 MHz) - thus the integers l_1 and l_2 would be in the hundreds of thousands. Such large integer values are hardly the "low order" integer values defined by Hill and clearly outside of the scope of "harmonically related" frequencies.

Accordingly, we ask that the Examiner withdraw the rejection. In the event that the Examiner finds any of the above unclear, we respectively ask that he contact the undersigned below prior to issuing a further action.

Applicant asks that all claims be allowed. Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 2/27/03

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***See attached document certifying that Marc M. Wefers has limited recognition to practice before the U.S. Patent and Trademark Office under 37 C.F.R. §10.9(b).**

BEFORE THE OFFICE OF ENROLLMENT AND DISCIPLINE
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Expires: December 23, 2003

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